DESCRIPTION

A FASTENING/UNFASTENING METHOD, A PLASTIC FASTENER, AN ENVELOPE, A BAG AND A TIE

Technical Field

The present invention relates to a fastening/unfastening method, a plastic fastener, an envelope, a bag and a tie. More specifically, the present invention relates to a fastening/unfastening method which permits easy and sufficiently strong fastening of various kinds of parts made of various materials to each other, such as fastening of a lid of an envelope to its main body, fastening of a pair of films composing an opening of a bag to each other and fastening of a lid of a container to its main body, while permitting easy unfastening, and a plastic fastener.

Background Art

Conventionally, various kinds of fasteners have been provided, and a typical example thereof is a metal or a plastic snap fastener. Usually, a snap fastener is composed of a male part and a female part. By pressing the male and female parts against each other, the snap fastener works to join things together, and by pulling these parts in the opposite directions, the snap fasteners works to unfasten the things from each other.

The snap fastener, however, has the following disadvantages. When the male and female parts are pulled for unfastening, tensil

forces are applied to base material, such as cloth, to which the male part and the female part are fitted. Therefore, the base material must be rigid enough to withstand the tensil forces. Accordingly, it is impossible to attach the snap fastener to elastic material, such as rubber. Also, if the male part and the female part of the snap fastener have a strong engagement power, corresponding tensil forces are necessary to cancel the engagement, and the base material must be rigid enough to withstand the tensil forces.

Further, when this kind of snap fastener is attached to base material, it is necessary to position the male part and the female part separately. Accordingly, a complicate transport/alignment system is necessary, and this is a cause of a high manufacturing cost. Further, the snap fastener is fitted to base material by nipping the base material or by sewing the snap fastener on the base material, and it is difficult to fit the snap fastener to, for example, a mesh bag or a paper bag. Moreover, the snap fastener has a thickness of at least 5mm when the male part and the female part are in engagement with each other, and the portion where the snap fastener is fitted is bulky. Therefore, a large space is necessary to store products with these snap fasteners fitted.

Meanwhile, a fastener which requires only a weak power for unfastening while having a sufficiently strong fastening power, which is not bulky, which is possible to fit to soft and elastic base material such as a film or a paper sheet has been demanded.

Disclosure of the Invention

An object of the present invention is to provide a fastening/unfastening method and a plastic fastener which require only a small power for unfastening while having a large fastening power and which are applicable to various kinds of base material such as films and sheets.

Another object of the present invention is to provide a plastic fastener which is thin and not bulky, which is easy to produce at low cost and which is easy to fit to base material.

Another object of the present invention is to provide an envelope, a bag and a tie with plastic fasteners which require only a small power for unfastening while having a large fastening power.

In order to attain the objects, the present invention provides a fastening/unfastening method using a plastic fastener comprising a first segment having a protrusion formed on a first base, the protrusion having identical sections in one direction and a second segment and a groove formed on the second base, the groove having identical sections in one direction. In the method, the protrusion and the groove are engaged with each other by pressures applied from respective back sides of the first base and the second base, and the engagement of the protrusion and the groove is canceled by sliding the protrusion together with the first base in the direction where the protrusion has identical sections and by sliding the groove together with the second base in the direction where the groove has identical sections.

The fastening/unfastening method according to the present

invention is a novel method, wherein a protrusion and a groove are engaged with each other by pressures applied to the protrusion and the groove perpendicularly from mutually opposite directions, while the protrusion and the groove are disengaged from each other by sliding of the protrusion and the groove in directions perpendicular to the pressing directions for the engagement.

In order to carry out the fastening/unfastening method according to the present invention, a short piece cut out from a plastic zipper which has a protrusion and a groove to be engaged/disengaged with/from each other and which has been conventionally used to close an opening of a plastic bag can be used. In closing/opening the plastic zipper, pressures/tensil forces are applied to the protrusion and the groove perpendicularly so as to engage/disengage the protrusion and the groove with/from each other. In the fastening/unfastening method according to the present invention, however, in order to disengage the protrusion and the groove from each other, the protrusion and the groove are slid in directions perpendicular to the pressing directions for the engagement. Thus, the fastening/unfastening method according to the present invention is different from a conventional method in the directions of forces applied for the disengagement of the protrusion and the groove from each other. According to the present invention, strength of engagement corresponding to the length of the cut piece (the length of the protrusion and the groove) is guaranteed, while for disengagement, only a weak power is necessary to slide the protrusion and the groove.

In the fastening/unfastening method according to the present invention, the protrusion and the groove which are engaged with each other by the pressures applied from the respective back sides of the first base and the second base do not necessarily have shapes which permit themselves to be released from the engagement by forces in directions opposite to the pressing directions for the engagement. In other words, the protrusion and the groove can be of shapes which prohibit themselves from being released from the engagement by forces in directions opposite to the pressing directions for the engagement. Making the protrusion and the groove in such shapes guarantees so strong engagement of the protrusion and the groove not to be canceled easily. Disengagement of the protrusion and the groove from each other is possible only by sliding of the protrusion together with the first base and sliding of the groove together with the second base.

A plastic fastener according to the present invention comprises a first segment having a first base and a protrusion formed on the first base, said protrusion having a stopper hook at its end and having identical sections in one direction, and a second segment having a second base and a groove formed on the second base, said groove being for nipping the hook of the protrusion and having identical sections in one direction. In the plastic fastener, the protrusion and the groove are engaged with each other by pressures applied from respective back sides of the first base and second base, and the engagement of the protrusion and the groove is canceled only by sliding of the protrusion together with the first base in the direction where the

protrusion has identical sections and sliding of the groove together with the second base in the direction where the groove has identical sections.

In the plastic fastener according to the present invention, the protrusion and the groove are pressed against each other from mutually opposite directions, and thereby, the protrusion and the groove come into engagement with each other. Then, the engagement is canceled only by sliding of the protrusion and the groove in directions perpendicular to the pressing directions for the engagement. Thus, the faster secures so strong engagement not to be canceled easily by forces in directions opposite to the pressing directions for the engagement. On the other hand, only a weak power is necessary to slide the protrusion and the groove in the directions where the protrusion and the groove have identical sections, respectively, so as to disengage the protrusion and the groove from each other. Therefore, this plastic fastener can be used to fasten things made of soft or elastic material, such as films and sheets. The bases of the fastener can be fixed on a plastic bag or a plastic container easily by fusing as long as the plastic material of the bag or the container is fusable with the plastic material of the fastener, and this plastic fastener is especially suited as a fastener for a plastic bag and a plastic container.

The plastic fastener according to the present invention is only about 2mm in thickness including the first base and the second base when the protrusion and the groove are in engagement with each other. Compared with conventional snap fasteners (5mm to 7mm in

thickness), the plastic fastener is very thin, and when the plastic fastener is fitted to base material, the fastener is not bulky.

Also, by adopting a method wherein after the first base and the second base are engaged with each other, the mutually engaged bases are fused or bonded with base material, the first segment and the segment can be handled as one part. More specifically, while cutting a pair of long bases with a protrusion and a groove engaged with each other into pieces of a necessary length, the cut pieces are fitted to base material one by one. Thus, the fastener fitting process is easy, and this process is much less costly than conventional fastener fitting processes.

Also, a plurality of protrusions may be formed on each of the first base and the second base such that grooves are made between the protrusions. In this case, the plurality of protrusions are engaged with the plurality of grooves, and the range of engagement is wide.

The first segment with a first base and a protrusion and the second segment with a second base and a groove may have identical sections with each other. Segments of one kind can be used as the first segment and as the second segment.

Further, on each of the back sides of the first base and the second base, an adhesive layer and if necessary, a separating sheet may be provided. In this case, the first base and the second base can be fitted to base material easily only by removing the separating sheets.

The plastic fastener can be produced by molding the first base

and the protrusion integrally and by molding the second base and the groove integrally by extrusion molding of melted plastic material from a mold in one direction.

Alternatively, on a plastic film, melted plastic material may be extruded from a mold in one direction, so that a protrusion and a groove are formed on the film after the extruded plastic material cools and hardens.

These manufacturing processes permit a use of facilities for manufacturing conventional plastic zippers, and this enables easy and costless mass production of plastic fasteners according to the present invention. In these manufacturing processes, a long plastic fastener is produced, and the long fastener shall be cut into pieces with a proper length.

An envelope according to the present invention comprises a main body and a lid for covering an opening portion of the main body, and the first segment and the second segment of the above-described plastic fastener are provided on the main body and on the lid, respectively, at positions opposite to each other.

A bag according to the present invention comprises the first segment and the second segment of the above-described plastic fastener on an inner surface in an opening portion, at positions opposite to each other. The bag can be made of paper, a plastic film, etc. The bag may further have a handle.

A tie according to the present invention comprises the first segment and the second segment of the above-described plastic fastener on both ends, respectively. The tie can be made of a plastic

film, elastic rubber, etc.

As well as these things, there are, for example, following goods provided with plastic fasteners according to the present invention:

plastic or cardboard containers of which lids are fastened to their main bodies by the plastic fasteners;

labels, posters, sheets, etc., each of which has one of the first and the second segments of the plastic fastener fitted on its back side, which are to be stuck on a wall or a board with the other segment of the fastener fitted thereon; and

clothes and gloves with the plastic fasteners substituting hooks, buttons and zippers.

Brief Description of the Drawings

Fig. 1 is a perspective view of a plastic fastener according to a first embodiment of the present invention.

Figs. 2a and 2b show an envelope with the fastener of Fig. 1, Fig. 2a being a front view and Fig. 2b being an enlarged view of an opening portion of the envelope.

Fig. 3 is a perspective view of the envelope of Fig. 2 showing an open motion of the envelope.

Fig. 4 is a front view of another exemplary envelope.

Figs. 5a and 5b show a plastic bag with the fastener of Fig. 1, Fig. 5a being a front view and Fig. 5b being an enlarged view of an opening portion of the bag.

Fig. 6 is a perspective view of another bag with the fastener.

Fig. 7 is a perspective view of another bag with the fastener.

Fig. 8 is a perspective view of clothes with the fastener.

Fig. 9 is a front view of a glove with the fastener.

Figs. 10a and 10b show a plastic container with the fastener, Fig. 10a being a perspective view when the container is opened and Fig. 10b being a perspective view when the container is closed.

Figs. 11a, 11b and 11c show a paper binder with the fastener, Fig. 11a being a front view when the paper binder is opened, Fig. 11b being a bottom view when the paper binder is opened and Fig. 11c being a bottom view when the paper binder is closed.

Fig. 12 is a perspective view of a bed sheet cover with the fastener.

Fig. 13 is a perspective view of a plastic fastener according to a second embodiment of the present invention.

Fig. 14 is an illustration showing an engagement range of the fastener of Fig. 13.

Fig. 15 is a front view showing molding of fasteners as shown by Fig. 13.

Fig. 16 is a perspective view of a molding machine for molding fasteners as shown by Fig. 13.

Fig. 17 is a front view of a tie with the fastener shown by Fig. 13.

Fig. 18 is a perspective view showing a process of manufacturing ties as shown by Fig. 17.

Fig. 19 is a front view of the tie in use.

Fig. 20 is a front view of ties as shown by Fig. 17, showing another example of usage of the tie.

Best Modes for Carrying out the Invention

Referring to the accompanying drawings, embodiments of a fastening/unfastening method, a plastic fastener and a manufacturing method thereof according to the present invention are described.

(First Embodiment of Fastener; See Fig. 1)

Fig. 1 is a plastic fastener 10 according to a first embodiment of the present invention. The fastener 10 has a first segment 10A and a second segment 10B. In the first segment 10A, a protrusion 12 with a hook at the end is formed on a first base 11 such that sections of the protrusion 12 in a direction (see arrow B) are identical. In the second segment 10B, a groove 16 for nipping the hook of the protrusion 12 therein is formed on a second base 15 such that sections of the groove 16 in a direction (see arrow B) are identical.

Further, on the back sides of the bases 11 and 12, adhesive layers 13 and 17 and separating sheets 14 and 18 are provided.

In producing the fastener 10, generally, melted plastic material, such as polypropylene and polyethylene is extruded in one direction from a mold. Thus, the base 11 and the protrusion 12 are molded integrally, and the base 15 and the groove 16 are molded integrally. The molded product is long, and the long product is cut into pieces (fasteners 10) with a length of 1cm to 2cm in the direction B.

When the fastener 10 is pressed from the back sides of the bases 11 and 15 in directions shown by arrows A and A', the protrusion 12 and the groove 16 come into engagement with each other. The bulging width of the protrusion 12 is larger than the opening width of the groove 16, and the protrusion 12 forces its way

into the groove 16 widening the opening of the groove 16. Therefore, once the protrusion 12 and the groove 16 get in engagement with each other, they will not be disengaged from each other by forces in directions perpendicular to the pressing directions for the engagement.

On the other hand, when the protrusion 12 and the groove 16 are slid in directions shown by arrows B and B' relatively to each other, they are disengaged from each other with only a small power. The bases 11 and 15, the protrusion 12 and the groove 16 are molded out of the plastic material, and frictions among these parts are small. Therefore, there is not a strong resistance in sliding the bases 11 and 15 relatively to each other.

Further, the statement that once the protrusion 12 and the groove 16 get in engagement with each other, they will not be disengaged from each other by forces in directions perpendicular to the pressing directions for the engagement means, for example, that in a case shown by Figs. 2a and 2b, the protrusion 12 and the groove 16 are not disengaged from each other by an ordinary power to open a lid 22 of an envelope 20.

(Envelope; See Figs. 2a and 2b-4)

Figs. 2a and 2b show an envelope 20 with the above-described fastener 10. This envelope 20 has a lid 22 extending from an opening portion of a main body 21. On the outer surface of the main body 21, at the opening portion, the base 15 (the second segment 10B) of the fastener 10 with the separating sheet 18 removed is stuck with its back side down. On the lid 22, the base 11 (the first segment 10A) of

the fastener 10 with the separating sheet 14 removed is stuck with its back side down. The bases 11 and 15 are stuck such that the protrusion 12 and the groove 16 extend in an extending direction of the opening portion of the envelope 20.

The fitting of the fastener 10 to the envelope 20 can be carried out by while cutting extruded molds of the bases 11 and 15 into pieces with a length as shown in Fig. 1, sticking the cut bases 11 and 15 on the lid 22 and on the main body 21 respectively.

The lid 22 is folded back from the state shown in Figs. 2a and 2b, and the back sides of the bases 11 and 15 are pressed to engage the protrusion 12 and the groove 16 with each other. In this way, the lid 22 is fastened to the main body 21. In order to disengage the protrusion 12 and the groove 16 from each other, as shown in Fig. 3, the portion where the fastener 10 is fitted is nipped between fingers, and the lid 22 is slid in a direction shown by arrow B.

Then, in order to close the envelope again, the bases 11 and 15 are pressed from the bask sides again to engage the protrusion 12 and the groove 16 with each other. For engagement and disengagement, there are no steps where strong fricative force and/or pressure are applied to the fastener 10, and there is little possibility that repetitious engagement and disengagement will wear the protrusion 12 and the groove 16.

Further, by putting a sticker 25 over the lid 22 and the main body 21 while the lid 22 is fastened to the main body 21 by the fastener 10 as shown in Fig. 3, unfastening of the lid 22 from the main body 21 caused by sliding of the fastener 10 in the direction shown by

arrow B can be certainly prevented. Also, it is apparent from the sticker 25 whether the envelope 20 has been opened.

As Fig. 4 shows, it is possible to provide two fasteners 10 in two positions.

Also, the first segment 10A and the second segment 10B may be stuck on either of the main body 21 and the lid 22. In each of the following embodiments in which the fastener 10 is used, also, the first segment 10A and the second segment 10B may be exchangeable, and the above-description of the usage and the operation of the fastener 10 can be adopted.

(Plastic Bag; See Figs. 5a and 5b)

A plastic bag 30 is of a three-side fused type. In Fig. 5a, the fused sides are shown as hatched portions. On the inner surface of the bag 30, in the upper opening portion 31, the first segment 10A and the second segment 10B of the fastener 10 are fitted so as to be opposite to each other.

The first segment 10A and the second segment 10B may be bonded on the inner surface of the bag 30. However, if plastic films 32 composing the bag 30 are fusable with the bases 11 and 15 of the fastener 10, it is possible to fuse the bases 11 and 15 with the plastic films 32 automatically during a process of making the bag 30. Further, the fastener 10 with the protrusion 12 and the groove 16 engaged with each other may be put and bonded between the films 32. In this case, the bases 11 and 15 can be fitted with no fear of locating the segments 10A and 10B out of positions.

(Bag; See Figs. 6 and 7)

Figs. 6 and 7 show bags 40 and 45 with the fasteners 10. The bags 40 and 45 are paper or plastic bags. In each of the bags 40 and 45, the first segment 10A and the second segment 10B are stuck on the inner surface of the bag, in positions opposite to each other.

(Clothes; See Fig. 8)

As Fig. 8 shows, the fastener 10 can be used as a snap fastener or a button of clothes 50. The clothes with the fasteners 10 are especially suited for patients under someone's care.

(Glove; See Fig. 9)

Fig. 9 shows a polyethylene glove 55. The first segment 10A and the second segment 10B are fitted to the glove 55 at an arm-side portion 56. By engaging the segments 10A and 10B with each other, the arm-side portion 56 can be squeezed.

(Plastic Container; See Figs. 10a and 10b)

As Figs. 10a and 10b show, the fastener 10 can be used to fasten/unfasten a lid 62 to/from a main body 61 of a plastic container 60. The lid 62 is capable of rotating on a connecting portion 63 between the lid 62 and the main body 61, and the container 61 can be opened and closed freely by pivoting the lid 61. As Fig. 10b shows, in order to cancel the fastening by the fastener 10, only a force in a direction shown by arrow B or arrow B' shall be applied to the main body 61 or the lid 62. Also, the container 60 can be closed again easily and securely.

Further, by putting a sticker on the matching portion of the lid 62 and the main body 61, the container 60 can be closed securely, and it is apparent whether the container 60 has been opened.

(Paper Binder; See Figs. 11a, 11b and 11c)

Figs. 11a, 11b and 11c show a paper binder 65 with the fastener 10. The paper binder 65 comprises a hard board foldable at a center into two parts 66 and 67, and a tab 68 foldable toward the board 67. The first segment 10A is fitted to the tab 68, and the segment 10B is fitted to a side portion of the board 66 such that the segments 10A and 10B will be opposite to each other.

(Bed Sheet; See Fig. 12)

Fig. 12 shows a bed covered with a bed sheet 70 with the fasteners 10. A plurality of fasteners 10 are provided such that the unfastening directions of the fasteners 10 are in a direction shown by arrow B, and only by pulling the sheet 70 in the direction shown by arrow B, all the fasteners 10 can be unfastened at once.

(Second Embodiment of Fastener; See Figs. 13 and 14)

Fig. 13 shows a plastic fastener 100 according to a second embodiment of the present invention. Two protrusions 102 protrude from a base 101 side by side. Each of the protrusions 102 has a stopper hook at its end, and sections of each protrusion 102 in a direction (see arrow B) are identical. Between the protrusions 102, a groove 103 is formed, and sections of the groove 103 in a direction (shown by arrow B) are identical. The fastener 100 can be produced by extrusion molding described in connection with the first embodiment out of the same material for the fastener according to the first embodiment.

The fastener 100 is composed of a couple of bases 101. The fastener 100 can be used for the envelopes, the bags and the container

shown by Figs. 2a and 2b-12.

When the back sides of the bases 101 are pressed in directions shown by arrows A and A', the protrusions 102 come into the corresponding grooves 103, and thus, the upper protrusions 102 and the lower protrusions 102 are engaged with one another. The width of the protrusions 102 is larger than the width of the space between the adjacent two protrusions 102, and each protrusion 102 comes into the corresponding groove 103 with its both sides interfering with the sides of the protrusions 102 protruding from the opposing base 101. Therefore, once the engagement is settled, the engagement will not be canceled by a force in a direction opposite the engaging direction. Also, there are necessarily two pairs of a protrusion and a groove engaged with each other.

However, by sliding the upper base 101 and the lower base 101 in directions shown by arrows B or B' relatively to each other, the engagement of the protrusions 102 can be canceled easily.

In the fastener 100, for fastening, the outer protrusions a and b interfere with the inner protrusions c and d, respectively, and bend outward, which facilitates mutual engagement of the protrusions. Also, this enables the space between the protrusions a and d and the space between the protrusions b and c to be designed smaller, which results in an improvement in the strength of engagement.

Also, even if the upper and the lower bases 101 are fitted out of positions in the directions shown by arrows C and C', the upper and lower protrusions can be certainly engaged with one another. More specifically, as Fig. 14 shows, as long as the bases 101 are positioned

such that the protrusion d is located within a range X from a position x where the tip of the protrusion d is immediately right of the tip of the protrusion c to a position x' where the tip of the protrusion a' is immediately left of the tip of the protrusion b, mutual engagement of the upper protrusions and the lower protrusions is possible.

Further, each of the bases 101 may have three or more protrusions 102. In view of flexibility of engagement, however, it is preferred that each of the bases 101 has two protrusions 102 as in the second embodiment.

The fastener 100 can be produced by a method shown by Fig. 15. Specifically, a wide base 101' with a plurality of protrusions 102 formed thereon is molded, and the wide base 101' is cut into pieces at a pitch of p such that each piece (fastener 100) has two protrusions 102. Further, the cut pitch p may be designed arbitrarily so that fasteners 100, each having an arbitrary number of protrusions 102, can be manufactured.

(Method of Molding Fasteners; See Fig. 16)

Next, an exemplary method of producing the wide base 101' with protrusions 102 formed thereon shown by Fig. 15 is described.

As Fig. 16 shows, while a roll of film, which is to be made into the base 101', is unrolled in a direction f via a receiving roller 120, melted plastic material, which is to be made into the protrusions 102, is extruded from an extrusion-molding nozzle 121 onto the receiving roller 120. The extruded protrusions 102, which are in a melted state, are polymerized with the base 101' at their bottoms. Then, the base 101' with the protrusions 102 pass through cooling water (not

shown), and thereby, the protrusions 102 are fixed on the base 101'.

Needless to say, as well as the method shown by Fig. 16, it is possible to extrusion mold the base 101' and the protrusions 102 at one time integrally.

(Tie; See Figs. 17-20)

Now, a tie 150 with fasteners 100 is described.

As Fig. 17 shows, the tie 150 is a plastic tape 151 with a series of five protrusions 102 on each end. As Fig. 18 shows, the tie 150 is produced by forming a series of five protrusions 102 integrally on each end of base material of the plastic tape 151 and by cutting the base material with the protrusions 120 formed thereon into tapes with a specified width at cut lines X. Thus, the tape 151 of this tie 150 also serves as a base. However, the tape 151 may be made of a material different from the material of the protrusions 102, for example, rubber, and the bases 101 with the protrusions 102 may be bonded on the tape 151.

As Fig. 19 shows, the tie 150 is used, for example, to bundle a plurality of items 160. By winding the tie 150 around the items 160 and by engaging the protrusions 120 with each other, the items 160 can be easily bundled. Also, only by sliding, the protrusions 102 can be easily disengaged. Providing a plurality of protrusions 102 is to make a tolerance of engagement. Protrusions 102 may be provided on one surface of the tape 151 from an end toward the center, and protrusions 102 may be provided on the other surface of the tape 151 entirely. Also, on both surfaces of the tape 151, protrusions 102 may be provided entirely.

Further, as Fig. 20 shows, a plurality of ties 150 may be connected to each other by engaging each other's protrusions 102 so as to make a longer tie with a desired length.

(Other Embodiments)

Plastic fasteners, envelopes, bags and ties according to the present invention are not limited to the embodiments above, it is to be noted that various changes and modifications are possible to those who are skilled in the art.

The protrusions and the grooves formed on the bases may have arbitrary sections. Also, the fasteners according to the present invention may be used for various things as well as the envelopes, the bags, etc. shown by Figs. 2a and 2b-12.